SCIENTIFIC REVIEW COMMITTEE MEETING
March 25, 2004

MEETING HIGHLIGHTS

SRC Members

Todd Wong (by phone)

Nahid Zoueshtiagh (absent)

Stan Romelczyk (represented by Gary Smith) (by phone)

Greg Adams

Katy Wolf

Gary Rubenstein (by phone)

Hal Taback

Karl Lany

William Dennison

Steve Simons

Martin Ledwitz

Ted Guth

Anoosheh Mostafaei (absent)

Russell Greenhouse (absent)

Phillip Hodgetts (absent)

Ronald Wilkness

Ron Joseph (absent)

Attendees

Duc Tran (by phone)

Dennis Acton

Gabe Trinidad

Marty Siebert

John Billheimer

Nick Nikkila

Martin Schlageter

Damon Erickson

Stephen Hurlock

Ricc Brindicci

Dan Monette

James Heumann

Rita Loof

S. Torres

Larry Vettraino (by phone)

AQMD Staff

Marty Kay

Alfonso Baez

Howard Lange

The handouts and audiotapes can be obtained through the Public Records Section of the Chief Prosecutor's Office. There may be a fee for this service.

Marty Kay welcomed the SRC members and the audience to the meeting. The topics listed below were discussed during the meeting.

- Minutes of January 22nd Meeting
- Responses to Comments from January 22nd Meeting
- New and Updated BACT - Part B Listings
- Proposed Update of BACT - Part D (MSBACT) guidelines
- Other Business

Minutes of the January 22nd Meeting

A committee member wished to correct the record regarding the discussion of the MSBACT change for Dry Cleaning, stating that it had not been stated at the meeting that Valclene had been delisted as a VOC, rather it had been stated that Valclene had been banned from production in 1996. AQMD staff agreed to make the change. *(Katy Wolf, IRTA; Marty Kay, AQMD)*

Responses to Comments from the January 22nd Meeting

AQMD staff stated that changes in the listings presented at the January 22nd meeting that had been agreed upon at the meeting, as well as any agreed-upon changes in the minutes from the prior meeting, had been made. Committee and audience members were advised that they could check the listings and minutes as posted on AQMD's web site.

At the January 22ndmeeting, AQMD staff had agreed to investigate and report back to the committee on the following items:

1. Regarding the E.I. Colton simple cycle gas turbine power plant, a committee member had suggested that staff check on similar plants at LADWP Harbor, THUMS Long Beach, Pasadena, Burbank and Glendale, which have similar permit limits. Staff had checked with the permitting team and found that, although there had been some initial problems, those plants are all doing well in meeting their permit limits and are all on track toward receiving their Permits to Operate. Another committee member had requested that staff check the Rule 218(c) data for the plant with regard to CO emissions. Staff had investigated this with the inspector assigned to the plant and had found that while there were a few CO exceedances caused by CEMS problems and the wild fires last fall and one NOx NOV due to operator error, with those exceptions, compliance with permit limits has been very good. Staff stated that the operation and compliance history would be checked again after the coming summer peak season. *(Howard Lange, AQMD)*

2. Regarding the Lambie Energy Center simple cycle gas turbine power plant, staff was to add information on the catalyst volume. Staff was unable to determine the catalyst volume because the SCR vendor refused to release it on the grounds that the catalyst company regards this information as confidential. Staff was to obtain specifics on the design errors that had caused NOx exceedances. Staff had determined that there had been three NOx exceedances, two of which had been caused by CEMS problems and one of which had been caused by a software programming error, all of which had been corrected. Staff was to check whether the Lambie permit limits had been used as the basis for any BACT determinations on similar equipment including the Modesto Energy Generating System (MEGS) plant. Staff had checked with BAAQMD and SJVUAPCD and had found that the no BACT determinations had been made based on the Lambie permit limits. *(Howard Lange, AQMD)*

3. Regarding the MSBACT update for stationary I.C. engines based on the NEO California power plant in Tehama County, staff was to obtain the 2004 source test results. The test was done in February and showed the following for the two engines tested as compared to the two engines that were tested in January 2003: NOx had increased by approximately 1 ppm and was approaching the 9 ppm limit, CO had remained about the same at about 20 ppm, VOC had increased from approximately 4 to approximately 15 ppm, and ammonia had increased from <1 to 2-3 ppm. A representative of the SCR vendor had been at site and had stated that the catalyst needed cleaning, which should lower the NOx and ammonia emissions. *(Howard Lange, AQMD)*

   A committee member asked what method had been used to measure VOC. Staff responded that the method was EPA TO-12. Another committee member added that this is an ambient, GCMS based method that has been adapted for extremely low VOC levels in flue gases. *(Greg Adams, Los Angeles County Sanitation Districts; Howard Lange, AQMD; Gary Rubenstein, Sierra Research)*

4. Regarding the MSBACT update for Dry Cleaning, a committee member had suggested that the requirement for a refrigerated condenser for petroleum solvent dry cleaning be eliminated since refrigerated condensers are no longer being used. Staff had discussed this with the permitting team and had been advised that dry cleaning equipment of this type is normally supplied with a refrigerated condenser and the requirement should therefore remain. The committee member responded that the equipment actually comes with an external chiller, not a refrigerated condenser, and the term “refrigerated condenser” should be replaced with “chiller”. Staff agreed to pursue this further. The same committee member had suggested that subcategory Valclene be removed since Valclene dry cleaning is no longer practiced. The team agreed with this suggestion, and it was agreed that the subcategory will be removed. *(Howard Lange, AQMD; Katy Wolf, IRTA)*

New BACT Part B, Section I Listings

Boiler, AES Huntington Beach (A/N 394419)

These are two identical 225 MW utility boilers that had been idle for many years. When AES applied to restart the boilers, AQMD determined that LAER for NOx, CO and VOC would be low-NOx burners, flue gas recirculation, SCR and catalytic oxidation with emission limits of 5 NOx, 5 CO and 5 NH3, all as ppmvd@3%O2. Unit 3 was started up first, which occurred in January 2002, and the unit began commercial operation in January 2003. The units have been used only for peaking service but have seen a substantial amount of operation in 2003. Unit 3 has been source tested and met all permit limits, and the test has been approved by AQMD's Monitoring & Source Test Engineering group.

The unit's CEMS has not yet been certified because of problems in developing a suitable certification certification protocol for the low CO concentrations being measured. The CEMS has been showing continuous compliance with the CO limit but some problems in consistently meeting the NOx and ammonia limits. The NOx and ammonia exceedances are short duration problems, and the plant has requested a longer averaging time for these pollutants. AQMD is considering this request. *(Howard Lange, AQMD)*

Discussion: A committee member asked whether the urea system is the pre-evaporation type or the direct injection type. Staff responded that it is the pre-evaporation type. Another committee member asked whether there is any significant NOx stratification. Staff was to look into this. The first committee member asked what was the basis for the ammonia exceedances since ammonia is not normally monitored continuously. Staff responded that the plant follows apparent ammonia emissions using parametric monitoring.

A committee member asked whether these limits will be considered BACT for boilers rated at and above 20 MMBtu/hr. Staff responded that there is no plan to update MSBACT based on this BACT determination.

A committee member asked whether there have been any NOVs issued on this equipment. Staff responded that one NOV has been issued for exceeding the NOx limit, which was attributed to operator error.

Two committee members suggested that we defer this matter until the averaging time is decided. Staff responded that the listing need not be delayed since the averaging time issue is documented in the listing. An audience member asked why a longer averaging time would help. Staff explained that a short-duration exceedance can more easily be averaged out over a longer averaging time. *(Gary Rubenstein, Sierra Research; Bill Dennision, Dennison & Associates; Steve Simons, Southern California Gas Co.; Karl Lany, SCEC; Gabe Trinidad, Maxon; Howard Lange, AQMD; Marty Kay, AQMD)*

Air Start Unit, United Airlines (A/N 386536)

This is a portable, diesel fueled gas turbine belonging to United Airlines (UAL) and used at LAX to startup airplanes when the airplane's auxiliary power system is unavailable. It was relocated to LAX from UAL's operation at a Chicago airport. It is a 396 hp Sunstrand gas turbine with an aircraft interface added by a German manufacturer. An air

start unit basically pressurizes the airplane's compressed air system, which can then be used to start one engine, and the other engines can then be started. The gas turbine is used basically as an air compressor, with pressurized air being bled off the turbine's compressor stage. This is one of four air start units that UAL has at LAX. The other three are self-motivated diesel I.C. engines. The I.C. engine type air start units are normally used not only to initiate startup of the airplane's engines but also to ventilate the cabin during cleaning. This turbine based unit is used for startup only, typically 5 to 10 minutes per use, because of the high pitched noise created by the turbine. Average usage of this unit over the past two years has been 17 hours per month.

The BACT determination was based on maximum concentration levels of NOx, CO and VOC guaranteed by the manufacturer, which are substantially below analogous BACT for diesel I.C. engines. Since the facility is in RECLAIM, the BACT concentration limits are not reflected in the permit. However, the BACT emission limits were used in the offset calculations. A source test, which has been approved by AQMD's Monitoring & Source Test Engineering group, confirmed that the unit operates with emissions at or below the guaranteed concentration limits. *(Howard Lange, AQMD)*

Discussion: A committee member asked why the concentration limits achieved by this equipment were not documented as LAER when the unit was first permitted in Chicago. Staff responded that other districts may be less diligent than AQMD about recording new BACT. Another committee member commented that the Chicago district may not have had a Title V program in place at the time.

A committee member commented that the .05 wt.% limit on sulfur in the fuel will soon be replaced by a .0015 wt.% limit in Rule 431.1 (effective June 1, 2004). Staff agreed to note this in the listing.

An audience member commented that the term "turbocharged" used in the listing to describe the gas turbine type, was inappropriate for gas turbines. Staff agreed to remove "turbocharged" from the listing.

An audience member commented that emission levels measured in a source test may not reflect actual emissions since the unit operates for such short periods. Staff responded that, while this is basically true, gas turbines come to steady state within a relatively short time after startup so source test emissions may be reasonably representative of actual emissions. *(Hal Taback, HTC; Bill Dennision, Dennison & Associates; Martin Ledwitz, Southern California Edison Co.; Audience Members; Marty Kay, AQMD)*

Spray Booth, Fletcher Coating (A/N 322432)

This facility operates spray booths for powder coating of metal parts. The metal parts are preheated to approximately 500F and then moved into the booth where powder is sprayed on to the heated metal surface. The powder melts in place to form the coating. Metal coating powders are inherently low in VOC. In VOC calculations for powder coating, if an acceptable VOC analysis is not available, AQMD generally uses a default assumption of 1% VOC by weight. This can be compared to VOC limits in Rule 1107, Metal Coating, which are 275 to 420 g/l and Rule 1115, Automobile Coating, which go up to 580 g/l. In addition, this facility is required to use zero-VOC cleanup materials. BACT

in this case is considered powder coating and use of zero-VOC cleanup materials. The listing reflects that this BACT is not appropriate for every metal coating operation.

In metal coating, a major distinction exists between functional and decorative coating operations. Functional coating is for corrosion protection, and decorative coating is for both protection and appearance. This facility is a functional coating operation. Staff had contacted a decorative coating facility and determined that similar low-VOC powders are available for decorative coating, and this had been noted in the listing. *(Howard Lange, AQMD)*

Discussion: A committee member asked whether the coated parts have to be baked for curing. Another committee member commented that curing was always needed. An audience member commented that these operations typically involve multi-zone ovens. Staff responded that this operation does not employ a curing oven. A committee member commented that powder coating is sometimes done by dipping the preheated metal parts into a fluidized bed of powder. A committee member commented that powder coating is a relatively low-cost method for coating metal and is used wherever possible.

An audience member asked who supplied the powders used in this facility. Staff responded that the facility uses three epoxy base powders, all supplied by 3M, but there are many types of powders and many suppliers. The audience member asked how many booths there are at this facility. Staff responded that there are four booths.

A committee member suggested that the equipment category should be changed to Powder Coating. Staff responded that it should remain Spray Booth since powder coating is one of many ways that metal parts can be coated in a spray booth. *(Bill Dennison, Dennison & Associates; Katy Wolf, IRTA; Gabe Trinidad, Maxon; Hal Taback, HTC; Rita Loof, RadTech; Karl Lany, SCEC; Howard Lange, AQMD; Marty Kay, AQMD)*

Updated BACT Part B, Section I Listing

Lithographic Printing, Heatset, Quebecor World (A/N 401090)

This large lithographic printing facility installed multiple new lithographic heatset presses vented to a common regenerative thermal oxidizer (RTO). In addition to normal BACT for heatset lithographic printing, consisting of a fountain solution VOC limit, a cleanup materials vapor pressure limit and a 30 ppm NOx limit, the RTO was required to achieve 99% destruction efficiency. This BACT determination was presented at the January 2003 SRC meeting and was listed in Part B, Section III of the BACT Guidelines, Other Technologies, pending completion of a source test on the RTO.

The RTO source test had since been completed and approved by AQMD's Monitoring & Source Test Engineering group. The source test showed that the RTO was achieving greater than 99% destruction efficiency. Staff therefore proposed to add the new data to the listing and promote it from Section III to Section I, AQMD BACT Determinations. It was mentioned that one committee member who has expertise in this area but could not attend the meeting had e-mailed his approval of staff's proposal. *(Howard Lange, AQMD)*

Discussion: An audience member asked whether the inks used at this facility are conventional lithographic inks. Staff responded that the inks are described as "paste" inks, and there was no further comment from anyone present.

Staff mentioned that the source test had actually shown 99.9% destruction efficiency and noted that this level of performance was probably partially due to the RTO being equipped with a "puff capture" system. Staff explained that the puff capture system eliminates the puff of untreated flue gas that normally occurs when an RTO undergoes flow reversal. A committee member pointed out that the inlet VOC loading was relatively high in this case, and the 99.9% destruction efficiency would be more difficult to achieve in cases with lower inlet VOC loadings.

An audience member pointed out that in section B6 of the listing the term "as C1" could be interpreted as "as chlorine". Staff agreed to change it to "as methane".

Staff pointed out that the RTO was apparently very low in NOx since the source test showed an outlet NOx level of 30 ppmvd@3%O2, which is not much higher than the NOx expected from the heatset oven. This was attributed to the fact that the RTO was not using any supplemental fuel. A committee member noted that this was made possible by the high inlet VOC loading. *(Rita Loof, RadTech; Gary Rubenstein, Sierra Research; John Billheimer, Enviro-Reality; Bill Dennison, Dennison & Associates; Howard Lange, AQMD)*

Proposed Update of Part D (MSBACT) Guidelines

New MSBACT Guideline for Distributed Generation

Staff is proposing to add a new MSBACT guideline for Distributed Generation (DG), which will be a new MSBACT category and will be the same regardless of the type of DG equipment to be used. DG is defined as power production for use by the facility in which it is produced and/or by another facility(ies) with which it has a direct energy interconnection(s). DG plants within AQMD must utilize natural gas, and virtually all employ either I.C. engine or gas turbine technology.

The proposed guideline is based on DG emission standards that have been enacted by CARB to take effect in 2007. SB1298, chaptered into law in 2000, required CARB to establish a certification program for DG equipment not requiring a district permit and required that emission limits in that program be equivalent to emissions produced by new central station power plants as soon as practicable. The CARB 2007 limits are thus based on emission limits being met by central station power plants and are much lower than current MSBACT for I.C. engines or small (<3 MW) gas turbines.

AQMD was requested by the Engineering Foundation and the Coalition for Clean Air to consider implementing the CARB 2007 standards now for DG equipment requiring a permit. AQMD agreed that this may be justified and explored the possibility of altering MSBACT. Staff found that several DG technologies can meet the 2007 standards: the Kawasaki Heavy Industries (KHI) 1.5 MW gas turbine-generator with the Xonon

catalytic combustor, which is already listed in Part B of the BACT Guidelines, two fuel cell technologies that have been certified by CARB, and large combined-cycle gas turbine power plants, of which several are listed in Part B.

To make MSBACT more stringent, AQMD must show that the proposed change is cost effective based on a specified calculation procedure and cost effectiveness criteria. Staff performed this analysis and found the KHI gas turbine to be cost effective and the fuel cell technology to not be cost effective. Therefore, the proposal was to establish new MSBACT for DG rated at or above 1.5 MW based on the CARB 2007 DG emission standards. A white paper describing the proposal and the cost effectiveness calculations was available to all attendees. *(Marty Kay, AQMD)*

Discussion: A committee member stated that his company defines DG as a small power plant owned by or contracted to an electric utility with the purpose of supporting a weak area in the grid at times of high power demand. *(Martin Ledwitz, Southern California Edison Co.)*

A committee member and audience member expressed concern that while the state is promoting DG, for example through subsidy funds authorized by AB970, this proposal would effectively stop new DG installations in the 1.5 to 7 MW size range within AQMD. This concern was based on the following points:

- For a DG project to go forward, a facility owner typically needs to see a payback period of 5 years or less. I.C. engine based plants can meet this criterion in many cases, but the KHI technology cannot. The DG market is now virtually 100% I.C. engines.
- The KHI technology, being limited to the 1.5 MW size, is suitable only for a case with 1.4 MW (or a multiple of 1.4 MW) electric load and approximately 2:1 thermal:electric load ratio.
- Gas turbines cannot follow load change nearly as well as I.C. engines. Of DG plants sized at 500 kW and above, approximately 80% are required to follow load changes part or all of the time.

These individuals felt that the proposal should be aired in additional public forums to allow more interested parties, especially equipment manufacturers, to comment.

The committee member made the following comments regarding the cost effectiveness calculations: (1) The values of power output and electrical efficiency assumed for the KHI technology did not allow for the effects of ambient temperature and elevation. (2) The catalyst replacement cost should be $30,000 per 8,000 hours of operation. (3) The cost and parasitic power demand of a fuel compressor should be considered since the KHI gas turbine requires a fuel pressure of 100 psig.

AQMD agreed to consider these comments. *(Steve Simons, Southern California Gas Co.; Martin Siebert, Cummins Cal-Pacific; Marty Kay, AQMD)*

A committee member commented that the CARB 2007 standards should not be required now since CARB, in delaying the compliance date to 2007, apparently feels that suitable technology is not yet available. Staff responded that there are some suitable technologies

available, although more costly than what is now being used, and the proposed action is intended to be technology forcing. *(Karl Lany, SCEC; Marty Kay, AQMD)*

A committee member noted that the Part B listing of the KHI technology, the installation at Silicon Valley Power, is not a DG plant and does not have permit limits as low as the CARB 2007 standards. Staff responded that (1) the fact that it is not a DG plant does not matter in establishing that the technology performs well in producing power and (2) substantial test data exist showing that the technology does meet the 2007 standards. *(Steve Simons, Southern California Gas Co.; Marty Kay, AQMD)*

A committee member asked whether the calculations included the cost of the Xonon catalytic combustor and catalyst replacement (every 8,000 hours). Staff responded that both were included, but that staff's information was that catalyst replacement was needed only every 12,000 hours. The committee member commented that (1) the poor load following and turndown capabilities of gas turbines are important considerations, (2) KHI guarantees the low emissions only at or very near full load, (3) the credits for boiler emission reductions taken in the cost effectiveness calculations are only valid if there is sufficient thermal load to utilize all of the recoverable waste heat, (4) it seems surprising that the maintenance cost assumed for the KHI technology is lower than that assumed for the I.C. engine and (5) the electrical efficiency of a gas turbine degrades at reduced load more so than that of an I.C. engine. Staff responded that (1) KHI does offer to guarantee the low emissions down to 70% load when necessary, (2) the basis for each assumption used in the calculations is given on the reverse side of the calculations page and (3) staff will consider the comments. *(Gary Rubenstein, Sierra Research; Howard Lange, AQMD)*

A committee member reiterated the need for more public airing of this proposal. Another committee member added that individuals in the Southern California Edison DG support group should be included in at least one such meeting. *(Steve Simons, Southern California Gas Co.; Martin Ledwitz, Southern California Edison Co.)*

A committee member was concerned that the costs assumed for the KHI technology in the cost effectiveness calculations may not be realistic in that the installation at Silicon Valley Power was subsidized by the developer and the California Energy Commission. Staff responded that the costs assumed for the KHI technology were not based on the Silicon Valley Power plant experience but were based on a study that was funded by the Energy Foundation. An audience member commented that the installed cost assumed for the KHI technology seemed low. Staff asked the audience member if he could provide an example of an actual cost quotation, and he agreed to do so. *(Karl Lany, SCEC; Dennis Acton, Southern California Boiler Co.; Howard Lange, AQMD; Marty Kay, AQMD)*

A committee member commented that availability of the KHI gas turbine in only one size, 1.4 MW net output, will restrict DG project sizes above 1.4 MW to multiples of 1.4 MW. Staff noted that KHI guarantees the emissions down to 70% load, which expands the power ranges that can be serviced by this technology. The committee member suggested that the cost calculations should be performed for the case of a derated turbine, and staff agreed to explore this. Another committee member mentioned that GE and Solar Turbine are coming out with other turbine sizes incorporating the Xonon combustor. Another committee member noted, however, that GE has terminated development of its 10-MW Xonon-related product. [However, it was learned at the May

27, 2004 meeting that while Solar is indeed working on development of a gas turbine model incorporating the Xonon catalytic combustor, the company has made no decision to commercialize such a product. Also at that meeting, a representative of Catalytica Energy Systems stated that the development agreement with GE is still in effect.] Staff added that it should not be essential that a DG project be of a certain size since the facility can always rely on the grid for power not supplied by the DG project.

A committee member stated that if the grid was to be considered a BACT alternative, evaluation of the cost effectiveness of the grid relative to a DG project should assume higher displaced boiler emissions than had been assumed in comparing DG technologies. Staff responded that while an assumption of higher boiler emissions is probably justified, boiler emission limits in AQMD permits have been fairly low for a long time. An audience member stated that the CARB 2007 limits are based on 1999 vintage new central station power plants. Staff added that to serve the growing demand for power in the area we must basically choose between increasing the amount of grid power and installing more DG plants. *(Gary Rubenstein, Sierra Research; Howard Lange, AQMD; Bill Dennison, Dennison and Associates; Steve Simons, Southern California Gas Co.; Marty Kay, AQMD)*

A committee member objected to the statement in the white paper that solar and wind based generation was an available alternative for large facilities. Staff responded that there is no intent to require that these technologies be used. The committee member was nonetheless concerned that the statement might be misunderstood or used out of context. *(Ron Wilkness, WSPA; Marty Kay, AQMD)*

An audience member stated that I.C. engine based DG should not be protected versus cleaner DG technologies that are available. A committee member responded that other issues are involved. One issue is whether AQMD wishes to adopt a policy of having BACT guidelines that require alternative basic technology. An audience member commented that allowing BACT to require alternative basic technology assists in development of cleaner but more costly technologies such as fuel cells. A committee member added that a good example of this was AQMD's requiring low-VOC cleaners, which replaced higher polluting vapor degreasers. Another committee member responded that this case is different because the proposed alternative technology does not fit the need in all cases (e.g., only available in one size). Another committee member added that the large amount of waste heat from a gas turbine as opposed to an I.C. engine also limits applicability of the KHI technology. Another committee member asked whether the DG project could be oversized and the excess power sold to the grid. Staff responded that this may be a possibility but the economics would be best if the project is undersized with some of the facility's power needs being met by purchase from the grid. *(Martin Schlageter, Coalition for Clean Air; Bill Dennison, Dennison and Associates; Steve Torres, Fuel Cell Energy; Katy Wolf, IRTA; Gary Rubenstein, Sierra Research; Hal Taback, HTC; Marty Kay, AQMD)*

Staff noted that DG projects utilizing landfill or digester gas, and probably "stranded gas" (produced gas not acceptable for sale to the pipeline), would be exempt from the proposed DG BACT. *(Marty Kay, AQMD)*

Other Business

Marty Kay announced that the date of the next meeting would be May 27 and thanked all attendees for their participation.

There was no further discussion, and the meeting was closed.